hardener 964*B*, and 'Araldite' accelerator 964*C*. Dibutyl phthalate is used as a plasticizing agent.

Originally a mixture of casting resin 10·0 ml., hardener 10·0 ml. and plasticizer was used for the initial shakings after fixation in osmic acid and dehydration in alcohol. Soaking times at 48° C. were 3 hr. in a mixture of ½ absolute alcohol, ½ 'Araldite', followed by three soakings of 3 hr. each in 'Araldite' alone. 0·4 ml. accelerator was then added to the mixture and the tissue was left to soak at room temperature for 12 hr. before the final embedding at 48° C. in accelerated 'Araldite'. The capsules were hardened at 48° C. for about 72 hr. before cutting.

It was early found that even a moderate increase in the concentration of accelerator produced a very hard and brittle block. It was possible to produce thin sections from such a block, but they invariably showed severe wrinkling, and it is now usual to discard any blocks which are found to be brittle during preliminary trimming. Reduction of accelerator produced plastic of a consistency that would cut without wrinkling, but this only applied to the supporting block. The tissue itself was often exceedingly soft and pasty, and it was obvious that the 'Araldite' had not penetrated in desirable concentrations. As it was known that the tissue could be hardened by additional accelerator it was suspected that the casting resin rather than the hardener was failing to penetrate, and this view was supported by the fact that the hardener is by far the less viscous of the two. As a result the soaking times were greatly prolonged, and the concentration of the casting resin in the early mixtures was increased. The concentrations used in the first soakings are now : casting resin 15 ml., hardener 5 ml., plasticizer 1 ml. After fixing and dehydration the tissue is soaked at 48° C. in a mixture of ½ absolute alcohol, ½ 'Araldite' for 6 hr., and then in pure 'Araldite' for 72 hr., the mixture being changed every 24 hr. The soaking is then continued for another 72 hr. in a mixture of casting resin 10 ml., hardener 10 ml. and plasticizer 1 ml., the resin again being changed every 24 hr. 0·3 ml. accelerator is then added for a 24 hr. soak at room temperature followed by the final embedding in a fresh accelerated mixture. With only 0·3 ml. accelerator hardening times at 48° C. are increased, and it is not unusual for the blocks to require baking for a week before they are suitably hard. Even now preliminary trimming may show the tissue to be undesirably soft, but further baking of the untrimmed capsules produces little improvement. If, however, the block is trimmed to expose the tissue in a small pyramid of soft plastic, further baking at 48° C. for 2–3 days will cause satisfactory hardening to a cutable consistency.

This embedding procedure has been successfully used on a variety of tissues, including pituitary, liver, various tumours, and striated muscle ; but even now it is rare to produce sections without a trace of wrinkling. Birbeck and Mercer[1] found that a narrow knife angle and very slow passage of the block across the blade would reduce wrinkling, as would the reduction of the cutting area of the block to very small dimensions. This has also been our finding, but with 'Araldite' it is often possible to obtain thin sections of up to 1 mm. square, and the increase in viewable tissue area is a great advantage. In these conditions, it is usually found that the portions of the section cut last show wrinkling, but this can largely be counteracted by trimming the block to rectangular shape and cutting with one long side to the blade.

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J. M. Davis

Department of Radiotherapeutics,
University of Cambridge.
Nov. 13.

[1] Birbeck, M. S. C., and Mercer, E. H., *J. Roy. Micro. Soc.*, Series 3, **76**, Part 4, 159 (1958).

A Simple Micro-Stirrer

A simple micro-stirrer has been developed for micro-analyses involving quantities of fluid varying from 1 ml. down to small drops of fluid which are titrated on waxed slides. Its main advantages over previous methods of micro-stirring are that it is cheap and relatively simple to make and can be controlled to give almost instantaneous even mixing without splashing or bubbling. It is therefore particularly suitable for continuous stirring while performing potentiometric or colorimetric titrations.

The stirrer (Fig. 1) consists of an electric bell assembly driven by means of a small domestic bell transformer which is tapped to give 3, 5 and 8 volts. For potentiometric titrations the bell is removed and a piece of stiff piano wire is attached to the hammer arm by means of a tight-fitting polyethylene sleeve. The piano wire is flattened at the sleeve end to prevent it turning and is then bent downwards through an angle of 90°. A piece of 'Tufnol' insulates the wire from the bell mechanism. The other end of the piano wire carries a small chuck, which holds a paddle-shaped electrode.

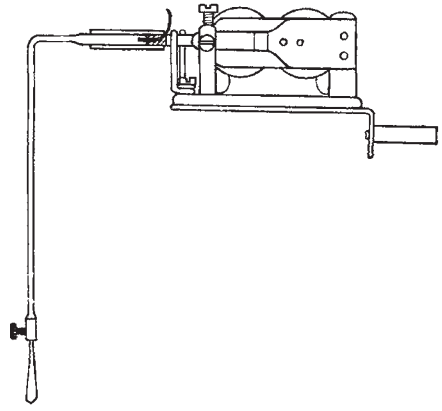

Fig. 1

Even and splashless stirring is obtained by limiting the travel of the hammer arm by means of two movable stops, one on each side of the arm. The high-frequency vibrations are transmitted and amplified by the whip of the stirring arm, the lateral vibrations of which should be very small to obtain the desired type of stirring. The amplitude of these vibrations is controlled by the length and stiffness of the wire, while their frequency can be altered by varying both the voltage energizing the bell and the setting of the interruptor set screw. For colorimetric titrations, particularly those carried out in an absorptiometer, a small glass paddle is recommended.

R. Morris

Department of Zoology,
University of Nottingham.
Nov. 18.